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# Agricultural Memorandum No 643

## Parasitic Gastro-Enteritis - a forecast formula

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A P.G.E. forecast is needed by early August. It was decided to use the autumn return to capacity data (B) as previous autumn factor (use of previous disease rating did not improve the fit) and it was found that only a very dry May had any significant effect on the rating. Three summer factors were chosen.

Product of Wet Days and Rainfall (in inches) for May - maximum of 15 = x
for June = y
for July = z

and the regression became

Rating = 0.28B +0.11x +0.066y + 0.097z - 2.91 with a multiple correlation of 0.97.

Tested independently on the years 1970-1974, the results gave a somewhat disappointing result, but which would not have been greatly misleading in practice. Details are given in the Appendix 1.

A search was then made for a shorter procedure, and the simple weather means of Cockle Park and Exeter were used.

With parameters B = return date
$x_1$ = wet days in May (maximum 8)
y = Product of wet days and rainfall (inches) in June
z = Product of wet days and rainfall (inches) in July

then rating = $0.284B + 0.177x_1 + 0.088y + 0.092z - 2.88$ (1)

with a multiple correlation of 0.95 and partial correlation of 0.70 on B, 0.79 on y and 0.88 on z. This result is very little inferior to the fuller approach.

The parameters are now very similar to those used in liver fluke forecasting so identical factors were introduced:-

u = W (Rainfall - Potential Transpiration + 4) in June
v = similar factor in July (where W = Wet days)

The result was

Rating = $0.2B + 0.135x_1 + 0.07u + 0.077v - 2.37$ (2)

with a multiple correlation of 0.965 and partial correlations of 0.62 on B, 0.85 on u and 0.92 on v.

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The 1970–74 years are still slightly anomalous, and a regression on the full 21 years is

$$\text{Rating} = 0.26B + 0.53x_1 + 0.05u + 0.073v - 5.01 \qquad (3)$$

with a multiple correlation of 0.90.

Details are given in Appendix 2.

Any comments or suggestions on this paper should be referred to the author.

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Appendix 1

| Year | Return Date | June R x WD | July R x WD | May R x WD | Disease Rating Actual | Disease Rating Estimated |
|---|---|---|---|---|---|---|
| 1954 | 8.1 | 29 | 23 | 15 | 6 | 5.1 |
| 1955 | 2.7 | 22 | 5 | 15 | 1 | 1.4 |
| 1956 | 9.8 | 24 | 46 | 3 | 6 | 6.2 |
| 1957 | 0.9 | 10 | 36 | 12 | 3 | 2.8 |
| 1958 | 5.3 | 55 | 34 | 15 | 7 | 7.1 |
| 1959 | 2.2 | 11 | 17 | 4 | 1 | 0.5 |
| 1960 | 8.7 | 8 | 68 | 11 | 8 | 7.8 |
| 1961 | 3.3 | 6 | 22 | 8 | 1 | 1.4 |
| 1962 | 7.9 | 1 | 15 | 15 | 3 | 2.5 |
| 1963 | 6.7 | 35 | 18 | 15 | 5 | 4.7 |
| 1964 | 5.5 | 23 | 10 | 15 | 2 | 2.8 |
| 1965 | 10.0 | 19 | 51 | 15 | 7 | 7.7 |
| 1966 | 3.2 | 34 | 24 | 15 | 5 | 4.2 |
| 1967 | 2.9 | 10 | 15 | 15 | 2 | 1.7 |
| 1968 | 3.6 | 25 | 27 | 15 | 5 | 4.0 |
| 1969 | 1.9 | 23 | 15 | 15 | 1 | 2.2 |
| Independent Test | | | | | | |
| 1970 | 8.2 | 8 | 30 | 3 | 1 | 3.1 |
| 1971 | 8.0 | 34 | 10 | 15 | 3 | 4.2 |
| 1972 | 7.9 | 36 | 17 | 15 | 4 | 5.0 |
| 1973 | 9.1 | 21 | 19 | 15 | 5 | 4.5 |
| 1974 | 5.6 | 21 | 25 | 13 | 6 | 3.9 |

Appendix 2

| Year | Return Date | May Wet days ($x_1$) | June WDR factor (y) | June WDR factor (u) | July WDR factor (z) | July WDR factor (v) | Actual | Disease Rating Estimate 1 | Disease Rating Estimate 2 | Disease Rating Estimate 3 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1954 | 10 | 8 | 23 | 37 | 21 | 31 | 6 | 5.3 | 5.7 | 5.9 |
| 1955 | 4 | 8 | 14 | 17 | 6 | 5 | 1 | 1.7 | 1.1 | 1.5 |
| 1956 | 10 | 5 | 18 | 28 | 30 | 39 | 6 | 5.2 | 5.3 | 4.5 |
| 1957 | -0.5 | 8 | 10 | 8 | 33 | 44 | 3 | 2.3 | 2.6 | 2.7 |
| 1958 | 7.5 | 8 | 46 | 59 | 36 | 44 | 7 | 8.0 | 7.7 | 7.3 |
| 1959 | 3.5 | 4.5 | 12 | 14 | 13 | 14 | 1 | 1.2 | 1.0 | 0.0 |
| 1960 | 8.5 | 5.5 | 4 | 6 | 76 | 94 | 8 | 7.9 | 7.7 | 7.3 |
| 1961 | 3.5 | 6 | 7 | 11 | 24 | 31 | 1 | 2 | 2.3 | 1.9 |
| 1962 | 7.5 | 8 | 1 | 1 | 17 | 25 | 3 | 2.3 | 2.2 | 3.1 |
| 1963 | 6.5 | 8 | 29 | 41 | 17 | 25 | 5 | 4.5 | 4.8 | 4.8 |
| 1964 | 7 | 7.5 | 22 | 31 | 3 | 5 | 2 | 2.6 | 2.6 | 2.7 |
| 1965 | 10 | 8 | 13 | 20 | 57 | 73 | 7 | 7.8 | 7.7 | 8.1 |
| 1966 | 2.5 | 8 | 33 | 45 | 15 | 20 | 5 | 3.5 | 3.9 | 3.6 |
| 1967 | 3 | 8 | 12 | 16 | 17 | 22 | 2 | 2.0 | 2.1 | 2.4 |
| 1968 | 4 | 8 | 20 | 26 | 36 | 45 | 5 | 4.7 | 4.8 | 4.9 |
| 1969 | 2.5 | 8 | 17 | 17 | 13 | 15 | 1 | 1.9 | 1.6 | 1.8 |
| 1970 | 8 | 3.5 | 7 | 6 | 38 | 46 | 1 | 4.1 | 3.7 | 2.6 |
| 1971 | 8.5 | 6.5 | 31 | 42 | 10 | 12 | 3 | 4.3 | 4.1 | 3.6 |
| 1972 | 9 | 8 | 40 | 49 | 14 | 19 | 4 | 5.9 | 5.4 | 5.4 |
| 1973 | 10 | 8 | 18 | 22 | 13 | 17 | 5 | 4.2 | 3.6 | 4.2 |
| 1974 | 8.5 | 8 | 15 | 21 | 15 | 20 | 6 | 3.7 | 3.4 | 4.0 |